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Matériel Test Procedure 8-2-082
Dugway Proving Ground

U. S. ARMY TEST AND EVALUATION COMMAND
COMMODITY ENGINEERING TEST PROCEDURE

DISPERSERS, RIOT CONTROL AGENT, PORTABLE

1. OBJECTIVE

The objective of this matériel test procedure (MTP) is to determine the technical performance and safety aspects of the test item relative to the criteria cited in applicable Qualitative Materiel Requirements (QMR's), Small Development Requirements (SDR's), Technical Characteristics (TC's), and other requirements and documentation that pertain to a particular test item.

2. BACKGROUND

Initial work on dispersers began during World War II. Increased emphasis on the development of these items was generated by military police requests for the development of a portable disperser for use in controlling riots and similar disturbances and for combat employment in harassing, incapacitating, or canalizing hostile enemy forces. Early work on a portable disperser indicated that modification of an existing flame thrower would satisfy the then established military requirements.

This type of disperser is carried on the operator's back and the operator disperses riot control agent by means of air pressure into the atmosphere. The disperser system generally consists of a tank, a dispersing hose, and a gun or triggered release means.

Other types of dispersers such as the Mity Mite Blower or the MARS Generator are in use but these systems are not entirely man-portable and operator controlled.

As new types of dispersers are developed, engineering testing is required to determine if the dispersers satisfy the established technical performance and safety requirements.

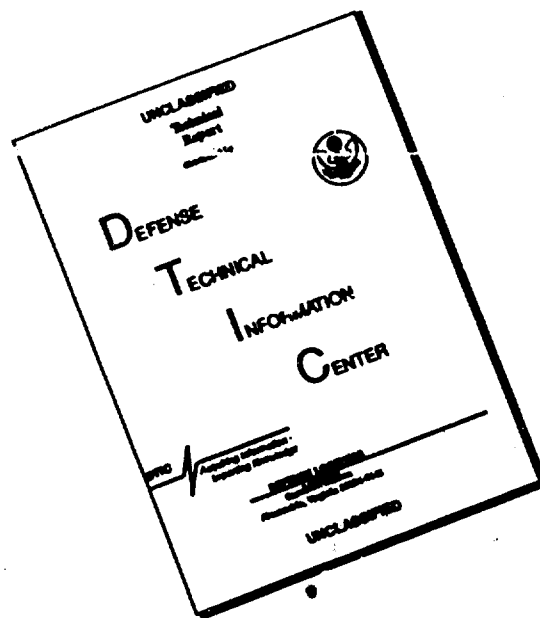
3. REQUIRED EQUIPMENT

a. Facilities

- 1) Suitable grid test range
- 2) Suitable area or chamber for dissemination of riot control agent
- 3) Environmental test chamber
 - a) Temperature/humidity
 - b) Salt fog
 - c) Rain
 - d) Dust
 - e) Pressure Altitude

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- f) Sunshine
- g) Fungus

b. Meteorological Equipment

- 1) Temperature recording equipment
- 2) Anemometers
- 3) Humidity recording equipment

c. Protective Clothing and Masks

d. First Aid and Medical Supplies

e. Applicable Riot Control Agent

f. Photographic Equipment (color and black and white)

- 1) Still
- 2) Motion

g. Laboratory Facilities for analyzing air samples

h. Plotting Equipment

i. Aircraft

j. Chemical Agent Detection Kits

k. Radiographic Equipment

l. Materials Handling Equipment, if required

m. Equipment as needed to pressurize the disperser

4.

REFERENCES

- A. FM 3-8, Chemical Corps Reference Handbook
- B. FM 19-25, Civil Disturbances and Disorders
- C. TM 3-300, Ground Chemical Munitions
- D. TM 3-1040-214-12, Operator and Organizational Maintenance Manual for Disperser, Riot Control Agent, Portable, M3
- E. AR 705-15, Operation of Materiel Under Extreme Conditions of Environment
- F. AR 705-35, Criteria for Air Portability and Air Drop of Materiel
- G. MIL-D-51031A, Disperser, Riot Control Agent, Portable, M3
- H. TI 3-1040-228-15, Operator, Organizational, Direct Support, General Support and Depot Maintenance Instructions Test Set, Flame Thrower-Riot Control Agent Disperser, Edgewood Arsenal, Maryland, May 1964
- I. MIL-STD-810, Environmental Test Methods, 15 June 1967
- J. AMC Pamphlet 706-134, Engineering Design Handbook, Maintainability Guide for Design, February 1966
- K. USATECOM Regulation 705-4, Equipment Performance Reports
- L. Woodson, W. E. and Conover, D. W., Human Engineering Guide to Equipment Designers, Second Edition, University of California Press, Berkeley, California, 1966
- M. MTP 7-1-002, Air Portability and Air Drop Service Testing
- N. MTP 7-2-509, Air Drop Capability of Materiel
- O. MTP 8-2-500, Receipt Inspection

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- P. MTP 8-2-503, Rough Handling and Surface Transport
- Q. MTP 8-2-510, Decontamination
- R. MTP 8-2-512, Leak Testing of Agent-Filled Munitions and Containers
- S. MTP 8-2-513, Dissemination Characteristics, CB Munitions/Dissemination Devices
- T. MTP 8-2-509, Radiography

5. SCOPE

5.1 SUMMARY

The procedures outlined in this MTP provide general procedures for determining the technical characteristics and performance of the test items. Specific testing requirements and procedures will be dictated by the performance and characteristics criteria for a particular test item.

The following procedures shall be performed on a selective basis as required to determine if the test item meets the criteria established:

a. Receipt Inspection - An inspection of the test item, as received, to: (1) determine its physical characteristics and condition; (2) locate any defects it might have; and (3) identify damage received during transport. During this inspection, the test items will also be serialized for subsequent identification purposes.

b. Safety Evaluation - The objective of this procedure is to check the safety statement issued by the developing agency, and to identify the safety hazards, if any, which must be included in the Safety Release Recommendation required by USATECOM Regulation 385-6.

c. Simulated Environmental Testing - A study to: (1) provide a basis for estimating the effects of extreme environments on the test item and (2) determine the effects of fresh water (rain) and salt water (salt fog) on the test item.

d. Rough Handling and Surface Transport - A study to determine the effects of rough handling and surface transport on the physical and operational characteristics of the test item.

e. Air Transportability - A study to determine the effects of subjecting the test item to air transport conditions.

f. Air Drop Capability - A study to determine the effects on the test item resulting from its being subjected to air drop conditions (delivery by parachute) and to also determine the ease or difficulty involved in delivery of the test item by parachutist.

g. Decontamination Aspects - A study to determine the relative ease or difficulty involved in decontamination of the test item and the effects of decontamination.

h. Maintenance Aspects - A study to determine the technical characteristics of the test item relative to design for maintainability provisions, aspects, and instructions.

i. Operational Reliability - A study to determine if the test item meets specified reliability criteria.

j. Radiography - A study to determine the structural and internal

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condition of the test item.

k. Leak Testing - A study to determine if the test item leaks when subjected to standard leak tests and conditions.

l. Human Factors - A study to determine the characteristics of the test item that involve human factors considerations in handling and operating the test item.

m. Dissemination Characteristics - A study to determine if the test item meets the established criteria for dissemination of its agent fill.

n. Agent/Hardware Compatibility - A study to determine if the riot control agent and disperser have a deleterious effect on each other.

5.2 LIMITATIONS

The subtests outlined in this MTP are limited to engineering tests and testing the items relative to safety aspects. This MTP deals only with systems which are man-portable and operator controlled.

6. PROCEDURE

6.1 PREPARATION FOR TEST

6.1.1 Safety Statement

The test officer shall ensure that a Safety Statement has been received from the developing agency and is understood before the test is started. The Safety Statement includes information pertaining to operational limitations and specific hazards peculiar to the test item.

6.1.2 Meteorological Requirements

The test officer shall ensure that the following meteorological considerations are observed during field testing:

a. Functional field tests shall not be initiated during precipitation or conducted in winds greater than 16 KM/hour unless specifically indicated by applicable materiel requirements criteria or requested by the ultimate user agency.

b. Functional field tests are not executed when the wind speed or direction exceeds the limitations cited in the applicable safety SOP for the particular test range.

6.1.3 Equipment Performance Report

An Equipment Performance Report, if required, shall be prepared and distributed in accordance with USATECOM Regulation 705-4.

6.1.4 Safety

1. Test and subtest plans and procedures shall ensure performance in the safest manner consistent with accomplishing the mission. The cardinal principle is to limit exposure of a minimum of personnel, for a minimum time, to a minimum amount of hazardous material consistent with safe and efficient

operations. Plans shall include safety procedures, precautions, protections, and emergency procedures as necessary. Technical information on the hazards and safety characteristics of the test item as provided by the Safety Statement (see Glossary) and other pertinent information shall be included. Such information shall include evaluation of potential hazards, analysis of risks, limitations, and precautions including special test equipment and techniques that should be incorporated in test plans and procedures.

b. A specific individual shall be charged with responsibility for safety. He shall be familiar with the construction and operation of the test item and its critical components, shall have full knowledge of the hazards and recommend control measures.

c. All personnel who participate in or observe the tests shall be briefed on the hazards involved and proper test methods and procedures.

6.1.5 Security

Security considerations shall be adequately determined and provided for as applicable to each test item.

6.1.6 Logistical Requirements

Prior to the conduct of the test, the test officer shall ensure that all logistical requirements are satisfied.

6.2 TEST CONDUCT

6.2.1 Receipt Inspection

Subject the test item to the applicable procedures of MTP 8-2-500 following its arrival at the test site with emphasis on the following:

- a. Visually inspect the test item package and record the following:
 - 1) Indications of damage, deterioration, or illegible markings
 - 2) Missing components, instructions or manuals
- b. Measure and record the length, width, height, and weight of the test item package.
- c. Unpack the test item and serialize it for future identification.
- d. Test item inspection:
 - 1) Visually inspect the test item and record all evidence of damage and deterioration, including:
 - a) Corrosion of hardware
 - b) Broken connections and deteriorated or cracked hoses or seals, and etc.
 - c) Contamination with foreign material (solid and/or liquid)
 - 2) Determine the presence of internal damage to test item as

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described in the radiography procedures of paragraph 6.2.10.

- 3) Determine the test item's leakage contamination as described in the leakage procedures of paragraph 6.2.11.

e. Determine and record the following:

- 1) Width, length, height, and weight of the test item
- 2) Radial and longitudinal center of gravity of the test item

f. Obtain photographs of damaged items

6.2.2 Safety Evaluation

- a. Observe the condition of the test item as received, and subsequent operation thereof, for unsafe aspects.
- b. Note jagged edges, rust, dents, loose connections, or any other condition or features which make utilization of the test item hazardous to personnel.
- c. Pay particular attention to the results of the rough handling and surface transport tests and the environmental tests.
- d. Verify the safety aspects as cited in the Safety Statement prepared by the developing agency.
- e. Collect data to be included in the Safety Release Recommendation (See Glossary) required by USATECOM Regulation 385-6.
- f. When the test item is fully charged and in operating option, check the high pressure component couplings for rigidity and security.

6.2.3 Simulated Environmental Testing

6.2.3.1 Extreme Temperature Tests

Unless otherwise directed, the test item shall be subject to the following temperature tests:

6.2.3.1.1 Low Temperature Tests - Place a minimum of 3 fully charged test items, which have successfully passed the leak test of paragraph 6.2.11 in a temperature chamber and perform the following:

- a. Reduce the chamber temperature to -80°F (-62.2°C), maintain it at -80°F for a period of 72 hours, and then visually inspect the test item and record any damages.
- b. Raise the chamber temperature to -65°F (-53.9°C) or its minimum operating temperature, and maintain this temperature until stabilization is reached. If stabilization is attained in less than 24 hours, maintain temperature for a complete 24 hour interval. Perform the following:

NOTE: Stabilization, unless otherwise specified, is considered to be reached when the temperature of the test item does not change more than 0.6°F (0.3°C) per hour.

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- 1) Visually inspect the test item and record any damages.
- 2) Remove test item and verify its operability as described in paragraph 6.2.9.

NOTE: Operability checks should be accomplished within 15 minutes of removing the test items from the chamber.

c. Increase the chamber temperature to the local ambient temperature and perform the following:

- 1) Visually inspect the test item and record any damages.
- 2) Subject one test item to the leak test procedures of paragraph 6.2.11.
- 3) Verify the operability of the test items by subjecting the remaining test item to the procedures of paragraph 6.2.9.

6.2.3.1.2 High Temperature Tests - Place a minimum of 4 fully charged test items, which have successfully passed the leak test of paragraph 6.2.11 in a temperature chamber and perform the following:

a. Adjust the chamber to a temperature of 155°F (88.3°C) and an absolute humidity of 13 grains/ft.³ and maintain these conditions for a minimum of 4 hours, then visually inspect the test items and record any damages.

b. Adjust the chamber to a temperature of 120°F (48.9°C) and a relative humidity of no greater than 15% and maintain these conditions for a minimum of 24 hours and perform the following:

- 1) Visually inspect the test items and record any damages.
- 2) Remove 1/2 the test items and perform the following:
 - a) Subject 1/2 of the test items to the leak test of paragraph 6.2.11.
 - b) Verify the operability of the test items by subjecting the remaining test items to the procedures of paragraph 6.2.9.

c. Adjust the chamber to local ambient temperature and humidity and perform the following:

- 1) Visually inspect the test items and record any damages.
- 2) Subject 1/2 of the test items to the leak test of paragraph 6.2.11.
- 3) Verify the operability of the test items by subjecting the remaining test items to the procedures of paragraph 6.2.9.

6.2.3.2 Fungus Test

a. Subject a minimum of 2 fully charged test items to the fungal exposure of reference 41 (MIL-STD-810) Method 508.

b. At the completion of the exposure period, perform the following:

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- 1) Disassemble 1 test item and record if any fungus was present on the test item components.
- 2) Verify the operability of the test items by subjecting the remaining test item to the procedures of paragraph 6.2.9.

6.2.3.3 Humidity Test

- a. Subject a minimum of 2 fully charged test items to the humidity cycling of reference 4I (MIL-STD-810) Method 507.
- b. At the completion of the cycling period, perform the following:
 - 1) Visually inspect the test items and record any signs of corrosion.
 - 2) Disassemble 1 test item and inspect the components for corrosion and/or deterioration.
 - 3) Verify the operability of the test items by subjecting the remaining test item to the procedures of paragraph 6.2.9.

6.2.3.4 Dust Test

- a. Subject a minimum of 2 fully charged test items to exposure conditions of reference 4I (MIL-STD-810) Method 510.
- b. At the completion of the exposure period, perform the following:
 - 1) Visually inspect the test items and record any surface damages noted
 - 2) Disassemble 1 test item and inspect the components for damages and/or presence of dust
 - 3) Verify the operability of the test items by subjecting the remaining test item to the procedures of paragraph 6.2.9.

6.2.3.5 Sunshine Test

- a. Subject a minimum of 2 fully charged test items to the sunshine conditions of reference 4I (MIL-STD-810) Method 505.
- b. At the completion of the exposure period, perform the following:

- 1) Visually inspect the test items and record any surface damages noted.

NOTE: Sunshine causes heating of equipment and fading of fabric colors, checking of paints, and deterioration of natural rubber and plastics.

- 2) Subject one test item to the leak test procedure of paragraph 6.2.11.
- 3) Verify the operability of the test item by subjecting the remaining test item to the procedures of paragraph 6.2.9.

6.2.3.6 Water Immersion Tests

a. Immerse a minimum of 3 fully charged test items in water to a predetermined depth.

NOTE: The water depth and temperature, and location of immersion shall be in accordance with applicable criteria and quality control system requirements and stipulated in the test directive.

b. Record the following with the test items immersed:

- 1) Depth of water over container
- 2) Temperature of water
- 3) Presence of bubbling to indicate container leakage
- 4) Immersion time until bubbling occurs
- 5) Total immersion time

c. At the completion of the immersion test, remove the test items and perform the following:

- 1) Visually inspect the test items for, and record the presence of, corrosion.
- 2) Disassemble one test item and inspect the components for, and record:
 - a) Evidence of water penetration
 - b) Presence of corrosion
- 3) Subject one test item to the leakage test of paragraph 6.2.1.1.
- 4) Verify the operability of the test items by subjecting the remaining item to the applicable procedures of paragraph 6.2.9.

6.2.3.7 Salt Fog Test

a. Subject a minimum of 3 fully charged test items to the conditions of Method 509 of reference 4I (MIL-STD-810).

b. At the completion of the salt fog spray exposure, perform the following:

- 1) Rinse the test items with clear water.
- 2) Visually inspect the test items for and record the presence of corrosion.
- 3) Disassemble one test item and inspect the components for, and record:
 - a) Evidence of water penetration
 - b) Presence of corrosion
- 4) Subject one test item to the leakage test of paragraph 6.2.1.1.

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- 5) Verify the operability of the test items by subjecting the remaining item to the procedures of paragraph 6.2.9.

6.2.3.8 Rain Test:

- a. Subject a minimum of 3 fully charged test items to the rain conditions of Method 506 of reference 4I (MIL-STD-810).
- b. At the completion of the rain exposure, perform the following:
 - 1) Visually inspect the test items for, and record the presence of, corrosion
 - 2) Disassemble one test item and inspect the components for, and record:
 - a) Evidence of water penetration
 - b) Presence of corrosion
 - 3) Subject one test item to the leakage test of paragraph 6.2.11.
 - 4) Verify the operability of the test items by subjecting the remaining item to the procedures of paragraph 6.2.9.

6.2.4 Rough Handling and Surface Transport Tests

6.2.4.1 Handling and Transportation Test

- a. Subject a minimum of 2 test items, crated/packaged for shipment, to the applicable procedures of MTP 9-2-503.
- b. At the completion of testing, perform the following:
 - 1) Visually examine the test item's package/crate for, and record the presence of, cracks, breaks, undone binding, etc.
 - 2) Visually examine the test items for, and record the presence of, damages and/or deformations.
 - 3) Subject one of the test items to the leakage test of paragraph 6.2.11.
 - 4) Verify the operability of the test item by subjecting the remaining item to the procedures of paragraph 6.2.9.

6.2.4.2 Vibration Test

- a. Subject a minimum of 2 test items, crated/packaged for shipment, to the procedures of Equipment Category g (Shipment by Common Carrier) of Method 514 of reference 4I (MIL-STD-810).
- b. At the completion of testing, repeat the procedures of paragraph 6.2.4.1.b.

6.2.4.3 Shock Test

- a. Subject a minimum of 2 test items, crated/packaged for shipment, to each applicable transit Test of Method 515 of reference 4I (MIL-STD-810).

b. At the completion of each transit test performed, repeat the procedures of paragraph 6.2.4.1.b.

6.2.3 Air Transportability

Determine the effects of pressure-altitude and vibration similar to that which will be experienced by the test item in flight as follows, and the ease of loading/unloading aircraft as follows:

6.2.5.1 Loading/Unloading

NOTE: Background information on air transportability is contained in MTP 7-1-002.

a. Load the test item, in its shipping container (crate/package), aboard aircraft, or simulated aircraft facilities as indicated in the test plan loading schedule using normal loading equipment and record the following:

- 1) Type of aircraft used/simulated
- 2) Shipping container length, width, height, weight and material
- 3) Equipment used for loading
- 4) Difficulties encountered while loading
- 5) Method of tie-down
- 6) Damage incurred to the shipping container while loading

b. Unload the test items from the aircraft/simulated aircraft and record:

- 1) Equipment used in unloading
- 2) Difficulties encountered while unloading
- 3) Damage incurred to the shipping container while unloading

6.2.5.2 Simulated Flight Test

a. Subject a minimum of 2 test items in their shipping containers (crate/package), to the following simulated conditions simultaneously:

- 1) Ambient pressure of the maximum altitude the test item is expected to be flown
- 2) Flight vibration conditions as described in the procedures of Equipment Category g (Shipment by Common Carrier) of Method 514 of reference 4I (MIL-STD-810)

b. At the completion of the simulated pressure-altitude/vibration testing, subject the test items and shipping containers to the procedures of paragraph 6.2.4.1.b.

6.2.6 Air Drop Capability

The air drop of the test item, when in its shipping container (crate/package) and when prepared for field use, shall be determined as described in

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the applicable sections of MTP 7-2-509 and as follows:

6.2.6.1 Shipping Container Test

a. Rig a minimum of 4 test items in the appropriate air drop containers and drop the containers from aircraft flying at the altitude and speed stipulated in the test plan. Record the following:

- 1) Aircraft used
- 2) Aircraft altitude
- 3) Aircraft air speed
- 4) Meteorological conditions
- 5) Air delivery system trajectory and impact velocities
- 6) Acceleration "G" force magnitude at impact

b. Conduct visual coverage of the air drop test procedures with motion and still camera.

c. At the completion of the test, perform the following:

- 1) Visually examine the test item's package for, and record the presence of cracks, breaks, undone bindings, etc.
- 2) Visually examine the test items for, and record the presence of damages and/or deformations.
- 3) Subject 1/2 of the test items to the leakage test of paragraph 6.2.11.
- 4) Verify the operability of the test items by subjecting the remaining test items to the procedures of paragraph 6.2.9.

6.2.6.2 Field Use Test

Repeat steps a, b, and c2 through c4 of paragraph 6.2.6.1 with a test item dropped-in field use condition.

6.2.6.3 Aerial Delivery by Parachutist

Perform the following:

a. Subject a minimum of 4 fully charged test items to aerial delivery by parachutists wearing the kit during the jump operation and equipped with other items normally carried.

b. Record any interference with other items of clothing, equipment or with the normal mobility of the parachutist during transport and jump operations.

c. Inspect the test items after landing and record any evidence of damage.

d. Disassemble 1/2 of the test items and inspect the components for damage.

e. Verify the operability of the test items using the procedures of paragraph 6.2.9.

6.2. Decontamination Aspects

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a. Decontaminate the test item as described by the applicable sections of MTP 8-2-510.

NOTE: The test item shall be decontaminated in accordance with applicable criteria. Various candidate test items, decontamination agents and other methods shall be used.

b. After the decontamination, verify the operability of the test items using the procedures of paragraph 6.2.9.

6.2.8 Maintenance Aspects

a. Determine the test item maintenance aspects in accordance with AMC Pamphlet 706-134.

NOTE: The features of design which permit or enhance the accomplishment of maintenance by personnel of average skill under environmental conditions, similar to those in which maintenance is to be performed, shall be recorded.

b. Determine and record the following, as required:

- 1) Ease of maintenance performed
- 2) Component interchangeability
- 3) Adequacy and accuracy of the maintenance documentations
- 4) Maintenance category of the test item
- 5) Mean-time-to-repair
- 6) Special tools required
- 7) Recommendations pertaining to improvements that could be made

c. Photographs where applicable should clarify comments.

6.2.9 Operational Reliability

NOTE: 1. Reliability testing shall be conducted under the conditions presented in the test criteria and under applicable instructions, as based upon requirements contained in the applicable QMR's or SDR's or TC's.

2. The test items undergoing operation reliability testing shall have previously been subjected to the following test procedures:

- a) Simulated environmental testing (paragraph 6.2.3)
- b) Rough handling and surface transport tests (paragraph 6.2.4)
- c) Simulated flight tests (paragraph 6.2.5.2)
- d) Air drop capability (paragraph 6.2.6)

a. Select a suitable test site for evaluation of the riot control agent.

NOTE: 1. The test site shall meet all safety requirements and be of sufficient area to ensure that contamination is

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- confined to the test site.
- 2. Types of agents to be utilized shall be indicated by governing performance criteria.
- b. Fire the test item as indicated in applicable SDR's, QMR's, or TC's using the short burst method.
- c. Photograph the test item, in action using high speed camera at the number of frames per second prescribed or appropriate to the test item. Record camera speed.
- d. Conduct and record the following measurements:
 - 1) The trigger pull for complete opening of the valve.
 - 2) The range of dispersal at the beginning of the spray and at the end of the spray.
 - 3) The area covered by the riot control agent.
 - 4) Disassemble the test item and measure the quantity of agent remaining in the container.
- e. Record the following for each performance:
 - 1) Ambient temperature
 - 2) Relative humidity
 - 3) Wind direction and speed
 - 4) Operability of the test item
- f. At the completion of operational reliability tests, record the following:
 - 1) Malfunctions
 - 2) Reasons for malfunctioning/nonfunctioning, if known
 - 3) Number and types of repairs required
 - 4) Other aspects as deemed applicable to the reliability estimate

6.2.10 Radiography

- a. Determine the internal and structural condition of the test item, using radiography, as described in the applicable sections of MTP 8-2-509 as directed in the test plan or at the following times:
 - 1) Upon receipt of the item
 - 2) At the conclusion of:
 - a) Receipt inspection (paragraph 6.2.1)
 - b) Rough handling and surface transportation tests (paragraph 6.2.4)
 - c) Air transportability (paragraph 6.2.5)
 - d) Air drop capability test (paragraph 6.2.6)
- b. Record the position of the test item or its components while

undergoing radiography tests.

NOTE: The test item's position shall be based upon applicable test criteria.

6.2.11 Leak Testing

a. Determine if the fully charged test item leaks as described in the applicable sections of MTP 8-2-512 at the completion of the following:

- 1) Extreme temperature tests (paragraph 6.2.3.1)
- 2) Salt fog tests (paragraph 6.2.3.7)
- 3) Rain tests (paragraph 6.2.3.8)
- 4) Sunshine tests (paragraph 6.2.3.5)
- 5) Rough handling and surface transportability tests (paragraph 6.2.4)
- 6) Simulated flight tests (paragraph 6.2.5.2)
- 7) Airdrop capability tests (paragraph 6.2.6)

b. Photographic evidence of damage, leakage, or any other failings that have a significant bearing on the evaluation of the test item shall be obtained.

c. When leakage is noted, make local repairs, if possible, and re-test the item. Record the following:

- 1) Repairs made
- 2) Effectiveness of repairs

6.2.12 Human Factors

Throughout the conduct of this MTP, observations shall be made relative to the human factors engineering characteristics of the test item. Specific areas of observation shall include the following:

- a. Adequacy of carrying strap
- b. Ease of handling, carrying, and operating
- c. Compatibility with field clothing and equipment, i.e., ease of operation when wearing protective clothing, gloves, etc.
- d. Adequacy of instructions
- e. Triggering mechanism's ease of pull and shutoff
- f. Ease and rapidity of unfastening harness
- g. Factors which caused frequent complaints from operators

NOTE: Background information on human factors engineering testing is available in reference 4L.

6.2.13 Dissemination Characteristics

a. Determine the dissemination characteristics of the test item as described in the applicable sections of MTP 8-2-513.

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NOTE: The test item shall be operated in accordance with the applicable test criteria and operating instructions for the item being tested.

b. In addition to the data collected during the conduct of MTP 8-2-513, determine and/or record the following:

- 1) Dispersion characteristics
- 2) Cloud persistency
- 3) Cloud characteristics
- 4) Measure the minimum amount of agent that can be discharged in a single burst as an effective cloud
- 5) Time of an effective burst
- 6) Weight of agent dispersed, per burst

NOTE: Such weight measurement shall be made by any convenient method.

7) Meteorological conditions

c. Photograph all operations with a motion picture with colored film.

6.2.14 Agent/Hardware Compatibility

- a. Remove agent from disperser and cross section disperser and valves.
- b. Clean any remaining agent from the inner wall of the disperser.
- c. Inspect inner surface of disperser for, and record the presence of corrosion, pitting, rust, peeling paint, or any deleterious effect agent fill may have had on disperser wall and valves.
- d. Use microscopic type photography to compare surface of casing of unfilled disperser with one which previously contained agent fill. Record fill effects.
- e. Determine purity of agent fill removed from the disperser. Note any deleterious effects of the disperser components on agent fill and compare with initial purity of agent.

6.3 TEST DATA

6.3.1 Receipt Inspection

a. Record the data collected as described in applicable sections of MTP 8-2-500 and the following:

- 1) For the test item package:
 - a) Indications of damage, deterioration, or illegible markings
 - b) Missing components, instructions or manuals
 - c) Length, width, height, in feet and inches

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- d) Weight, in pounds
- b. For the test item:
 - 1) Evidence of damage or deterioration:
 - a) Corrosion of hardware
 - b) Broken connections and deteriorated or cracked hoses or seals, etc.
 - c) Evidence of contamination from foreign material
 - 2) Radiography data collected as described in paragraph 6.2.10
 - 3) Leakage data collected as described in paragraph 6.2.11
 - 4) Height, width and length, in feet and inches
 - 5) Weight, in pounds
 - 6) Location of radial and longitudinal centers of gravity
- c. Retain all photographs

6.3.2 Safety Evaluation

Record the following:

- a. Any hazardous characteristics
- b. Any actual or possible interference noted
- c. Information for inclusion in the Safety Release Recommendation

6.3.3 Simulated Environmental Tests

6.3.3.1 Extreme Temperature Tests -

6.3.3.1.1 Low Temperature Tests

Record the following for each test item, as applicable:

- a. Test item identification number
- b. For temperature of -80°F:
 - 1) Damages incurred
- c. For temperature of -65°F:
 - 1) Damages incurred
 - 2) Operability data collected as described in paragraph 6.2.9
- d. For ambient temperature:
 - 1) Temperature in ° F
 - 2) Test item damage
 - 3) Leakage data collected as described in paragraph 6.2.11
 - 4) Operability data collected as described in paragraph 6.2.9

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6.3.3.1.2 High Temperature Tests -

Record the following for each test item, as applicable:

- a. Test item identification number
- b. For temperature of 155°F:
 - 1) Damages incurred
- c. For temperature of 120°F:
 - 1) Damages incurred
 - 2) Leakage data collected as described in paragraph 6.2.11
 - 3) Operability data collected as described in paragraph 6.2.9
- d. For ambient temperature:
 - 1) Temperature in °F
 - 2) Damages incurred
 - 3) Leakage data collected as described in paragraph 6.2.11
 - 4) Operability data collected as described in paragraph 6.2.9

6.3.3.2 Fungus Test

Record the following for each test item:

- a. Test item identification number
- b. Presence of fungus on:
 - 1) Test item
 - 2) Test item components
- c. Operability data collected as described in paragraph 6.2.9

6.3.3.3 Humidity Test

Record the following for each test item:

- a. Test item identification number
- b. Evidence of corrosion on:
 - 1) Test item
 - 2) Test item components
- c. Operability data collected as described in paragraph 6.2.9

6.3.3.4 Dust Test

Record the following for each test item:

- a. Test item identification number

- b. Damage to:
 - 1) External surface
 - 2) Test item components
- c. Presence of dust on test item components
- d. Operability data collected as described in paragraph 6.2.9

6.3.3.5 Sunshine Test

Record the following for each test item:

- a. Test item identification number
- b. Damage to:
 - 1) External surface
 - 2) Test item components
- c. Leakage data collected as described in paragraph 6.2.11
- d. Operability data collected as described in paragraph 6.2.9

6.3.3.6 Water Immersion Tests

Record the following for each test item, as applicable:

- a. Test item identification number
- b. During immersion:
 - 1) Depth of water over container, in inches
 - 2) Water temperature, in °F
 - 3) Presence of bubbling, if any
 - 4) Immersion time to bubbling, if any, in minutes
 - 5) Total immersion time, in minutes
- c. For the test item:
 - 1) Presence of corrosion:
 - a) Test item
 - b) Test item components
 - 2) Presence of water penetration
 - 3) Leakage data collected as described in paragraph 6.2.11
 - 4) Operability data collected as described in paragraph 6.2.9

6.3.3.7 Salt Fog Test

Record the following for each test item, as applicable:

- a. Test item identification number
- b. Evidence of corrosion:

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- 1) Test item
- 2) Test item components

- c. Evidence of water penetration
- d. Leakage data collected as described in paragraph 6.2.11
- e. Operability data collected as described in paragraph 6.2.9

6.3.3.8 Rain Test

Record the following for each test item, as applicable:

- a. Test item identification number
- b. Presence of corrosion:

- 1) Test item
- 2) Test item components

- c. Evidence of water penetration
- d. Leakage data collected as described in paragraph 6.2.11
- e. Operability data collected as described in paragraph 6.2.9

6.3.4 Rough Handling and Surface Transport Tests

Record the following for each test item, as applicable:

6.3.4.1 Handling and Transportation Tests

Record the following for each test item, as applicable:

- a. Test item identification number
- b. Data collected as described in applicable sections of MTP 8-2-503
- c. Evidence of wear and damage to:

- 1) Test item
- 2) Components

- d. Leakage data collected as described in paragraph 6.2.11
- e. Operability data collected as described in paragraph 6.2.9

6.3.4.2 Vibration Tests

Record the following for each test item, as applicable:

a. Data as collected under the applicable sections of MIL-STD-810,
Method 514.

- b. Data as collected under paragraph 6.2.4.1.b

6.3.4.3 Shock Test

Record the following for each test item, as applicable:

- Method 516. a. Data as collected under the applicable sections of MIL-STD-810,
 b. Data as collected under paragraph 6.2.4.1.b

6.3.5 Air Transportability

6.3.5.1 Loading/Unloading

Record the following:

- a. Type of aircraft used or simulated
- b. Shipping container:
 - 1) Length, width and height, in inches
 - 2) Weight, in pounds
 - 3) Material
- c. Equipment used in loading
- d. Difficulties encountered while loading
- e. Method of tie-down
- f. Damage incurred to the package while loading
- g. Equipment used in unloading
- h. Difficulties incurred in unloading

6.3.5.2 Simulated Flight Test

Record the following for each test item, as applicable:

- a. Altitude simulated, in feet
- b. Test item identification number
- c. For test item shipping container:
 - 1) Presence of cracks, breaks, etc.
 - 2) Undone binding, if applicable
- d. For test item individual package:
 - 1) Presence of cracks, breaks, etc.
 - 2) Undone binding, if applicable
- e. Damage and deformation to the test item's exterior
- f. Leakage data collected as described in paragraph 6.2.11
- g. Operability data collected as described in paragraph 6.2.9

6.3.6 Air Drop Capability

6.3.6.1 Shipping Containers and Field Use Tests

- a. Record the following for each test item:
 - 1) Condition of test item (packaged, ready for field use)

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- 2) Test item identification
- 3) Aircraft used
- 4) Aircraft air speed
- 5) Air conditions (calm, turbulent)
- 6) Air delivery system trajectory
- 7) Test item impact velocity in fps
- 8) Acceleration force of impact in G's
- 9) For test item package:
 - a) Packaging material used
 - b) Presence of cracks, breaks, etc.
 - c) Undone binding
- 10) For air test item:
 - a) Damage or deformities
 - b) Leakage data collected as described in paragraph 6.2.11
 - c) Operability data collected as described in paragraph 6.2.9

b. Retain all motion and still pictures

6.3.6.2 Aerial Delivery by Parachutist

a. Record the following for each test item as applicable:

- 1) Test item identification number
- 2) Aircraft position at release
- 3) Aircraft velocity at release in miles per hour
- 4) Aircraft altitude at release in feet
- 5) Impact force in pounds
- 6) Interference with parachutists' clothing or normal mobility during:
 - a) Transport operations
 - b) Jump operations
- 7) Evidence of damage to:
 - a) Test item
 - b) Components (disassembled items only)
- 8) Operability data as collected under the applicable sections of paragraph 6.2.9

b. Retain all photographs

6.3.7 Decontamination Aspects

Record the following for each test item undergoing decontamination:

a. Data collected as described in the applicable sections of MTP 8-2-510.

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b. Operability data collected as described in the applicable procedures of paragraph 6.2.9.

6.3.8 Maintenance Aspects

a. Record the following:

- 1) Special tools required for maintenance
- 2) Mean-time-to-repair
- 3) Component interchangeability
- 4) Ease of maintenance
- 5) Adequacy and clarity of maintenance instructions and manuals
- 6) Maintenance category
- 7) Recommendations regarding improvements that could be made

b. Retain all photographs

6.3.9 Operational Reliability

a. Record the following for each individual test item undergoing operability tests:

- 1) Test item's identification number
- 2) Temperature in °F
- 3) Relative humidity
- 4) Wind direction and speed, in mph
- 5) Operability of test item
- 6) Actual prescribed operating distance, in feet
- 7) The following measurements:
 - a) Range of dispersal, in yards
 - b) Area covered by riot control agent, in sq. yds.
 - c) Amount of agent, remaining in container after operations
 - d) Amount of trigger pull for complete opening of the valve, in pounds
- 8) Results of the laboratory analysis determining the effectiveness of the agent as dispersed
- 9) Camera speed, in frames per second

b. Record the following for all operability tests:

- 1) Malfunctions
- 2) Reasons for malfunctions/nonfunctions, if known
- 3) Number and types of repairs required
- 4) Other aspects as deemed applicable to the reliability estimate

c. Retain all photographs

6.3.10 Radiography

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- a. Data shall be collected and recorded as described in applicable sections of MTP 8-2-509.
- b. Record the position of the test item while undergoing radio-graphy checks.

6.3.11 Leak Testing

Data shall be collected and recorded as described in the applicable sections of MTP 8-2-512.

6.3.12 Human Factors

Record the following for the test item, as applicable:

- a. Adequacy of carrying strap
- b. Ease of handling, carrying, and operating
- c. Compatibility with other clothing and equipment
- d. Adequacy of instructions
- e. Ease of pull and shutoff of trigger mechanism
- f. Ease and rapidity of unfastening harness
- g. Factors which caused frequent complaints from operators

6.3.13 Dissemination Characteristics

a. Record the following for the test item:

- 1) Dispersion characteristics
- 2) Cloud characteristics
- 3) Cloud persistency
- 4) Minimum amount of agent which can be dispersed in a single burst as an effective cloud
- 5) Time, in minutes, of an effective burst
- 6) Weight, in pounds, of agent dispersed per burst
- 7) Temperature in °F
- 8) Relative humidity, in percent
- 9) Wind direction and speed, in mph

b. Retain all photographs

6.3.14 Agent/Hardware Compatibility

a. Record the following for each test item:

- 1) Test item identification number
- 2) Presence of the following on the test item inner surface:
 - a) Corrosion
 - b) Pitting
 - c) Rust
 - d) Peeling paint
 - e) Deleterious effect of agent fill

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- 3) Effects of fill on casing surface
- 4) Effects of test item components on agent fill

- b. Retain all photographs
- c. Retain all laboratory analysis

6.4 DATA REDUCTION AND PRESENTATION

6.4.1 Receipt Inspection

- a. Data collected as a result of this procedure shall be presented as indicated in the applicable portions of MTP 8-2-500.
- b. The description of the test item, number of items tested, and conditions upon receipt shall be presented in tabular form.
- c. Results of the leak subtest shall be presented in narrative or other convenient form.
- d. Photographs and X-ray pictures shall be used to substantiate results.

6.4.2 Safety Evaluation

- a. A Safety Release Recommendation (USATECOM Regulation 385-6) shall be forwarded to the U. S. Army Test and Evaluation Command within 30 days of the beginning of the test. The Safety Release Recommendation shall contain the following information: special safety considerations or hazards to personnel and materiel (including developmental types of equipment as well as standard components used in assemblage of items being tested).
- b. Data and comments relative to the safety hazards observed during any phase of testing.
- c. Comments relative to suggested safety improvements.

6.4.3 Simulated Environmental Testing

- a. The results of the subtests conducted shall be presented in tabular or other suitable form.
- b. The results of the operational check tests performed at the conclusion of the various environmental tests shall be presented in narrative or other suitable form.

6.4.4 Rough Handling and Surface Transport

- a. Rough handling and surface transport data shall be presented as prescribed in MTP 8-2-503.
- b. Vibration and shock data shall be presented in tabular form to indicate test times, distances (dropped), shock levels, vibration frequencies, etc., and significant findings of the test. Include photographs of damage.
- c. Present data on operation of test item after subjection to rough handling and surface transport, conditions, vibration and shock.

6.4.5 Air Transportability

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a. Data shall be presented in summary form as indicated in the applicable sections of MTP 7-1-002, and other pertinent testing documentation and include the pressure-altitude cycling and vibration conditions the test item was subject to.

b. Present data regarding any significant aspects of the test item observed during conduct of air transport testing.

c. Present data on test item operation after subjection to the air transport testing.

6.4.6 Air Drop Capability

6.4.6.1 Shipping Containers and Field Use Tests

a. The results of the subtest shall be presented as prescribed in MTP 7-2-509 and include the following:

- 1) Type of aircraft
- 2) Air speed, altitude, and meteorological conditions
- 3) Packaging material condition after test
- 4) Maximum "G" force on opening of parachute and on impact

b. Present narrative comments and data regarding ease or difficulty encountered in accomplishing air drop. Present photographs (as required) to indicate results of air drop.

c. Present data on operation and performance of the test item after air drop capability subtest.

6.4.6.2 Aerial Delivery by Parachutist

a. Present data for each test item in tabular form for comparison and evaluation.

b. Narrative comments, photos, etc., shall be included, as applicable.

c. Operability results shall be presented in tabular form.

6.4.7 Decontamination Aspects

The results of this subtest shall be presented as indicated in the applicable sections of MTP 8-2-510.

6.4.8 Maintenance Aspects

Data from this subtest shall be presented in narrative form. The report shall be supplemented by photos, drawings, or other devices to substantiate the conclusions and recommendations.

6.4.9 Operational Reliability

Data derived from this subtest shall be presented in narrative form, supplemented by drawings, photographs, charts, tables, graphs, or any other suitable means of displaying information. The report shall clearly conclude

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whether the test item meets the reliability criteria established in applicable specifications. Recommendations relative to further testing and methods to overcome malfunctions shall also be included.

6.4.10 Radiography

- a. The results of this subtest shall be presented as prescribed in MTP 8-2-509.
- b. X-ray photographs, supplemented by narrative explanations, shall be included, as required.

6.4.11 Leak Testing

- a. The results of leak testing shall be presented as prescribed in MTP 8-2-512.
- b. Narrative comments, photos, etc., shall be included, as required.

6.4.12 Human Factors

- a. Data from this subtest shall be presented in tabular, narrative, or other suitable form supplemented by photographs and graphic or art presentations as required.
- b. A summary of comments regarding shortcomings and recommended improvements shall be presented.

6.4.13 Dissemination Characteristics

- a. The results of this subtest shall be presented as prescribed in MTP 8-2-513.
- b. Drawings, tables, charts, photographs, or other means of presentation shall be included to report sampling techniques, sampling results, etc.
- c. Narrative comments shall be included, as required.

6.4.14 Agent/Hardware Compatibility

Data from this subtest shall be presented in narrative form and shall clearly indicate whether a riot agent has an effect on the test item, its' components, or vice versa. The report shall be supplemented by photographs, drawings, or other devices required to support the conclusions.

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GLOSSARY

1. Safety Statement: A statement issued by the developing agency which includes information pertaining to operational limitations and specific hazards peculiar to the systems or components tested.
2. Safety Release Recommendation: A statement issued by the testing agency containing information pertaining to the safety, or the hazards involved to personnel, of all materiel, including development types and standard components used in the assemblage of items being tested. Within thirty (30) days of the beginning of the test, this Safety Release Recommendation shall be forwarded (ASAP) to U. S. Army Test and Evaluation Command in compliance with TECOM Regulation 385-6.